PREDICTION OF INTER-MUSCULAR FAT IN THE FRESH PORK LEG

A. J. Stetzer[1], R. E. Klont[2], A. A. Sosnicki[2], F. K. McKeith[1]
[1]University of Illinois at Urbana – Champaign, Urbana, IL, 61801, USA, and [2]PIC USA, Franklin, KY

Background

Consumers continue to demand home-cooked taste as they purchase more ready-to-eat foods. Ham is a key raw material utilized for many of these foods because of ease of preparation and high flavor. The demand for center cut slices and spiral sliced hams has increased, however, one of the drawbacks of these products is the presence of inter-muscular fat commercially recognized as "Star fat" and seam fat. Thus, the pork industry has identified a need to measure and predict star fat to aid in selecting hams more suitable for center cut slices.

Objectives

The objective of this experiment was to quantify the relationship of linear carcass measurements to star fat in hams and to predict the amount of star fat in hams.

Material and methods

A total of 90 carcasses, 45 gilts (G) and 45 barrows (B), of the same genetic background were selected based on hot carcass weight (HCW) at ranges of 70.8 - 83.6 kg, 84.4 - 90.4 kg, and 90.9 - 98.9 kg (L, M and H groups, respectively). Linear carcass measurements were taken at 24 h post-mortem. Paired fresh pork legs (n = 178) were utilized in which the left side was processed into hams for center cut slice (Figure 1) area measurements and processing yields. Four to six center cut slices were removed per ham, and total area of lean, star fat, and bone was measured per slice by three evaluators. Right side fresh pork legs were utilized for fresh ham composition and cut yields. Three subcutaneous fat thickness points were measured on the right fresh pork leg. The initial fat depth measurement was evaluated perpendicular to the midpoint of the dorsal-ventral line of the ham, while subsequent measurements were taken at 45° angles dorsal and ventral) from the midpoint. Individual muscles or muscle groups were excised and weighed. Data were analyzed with the MIXED procedure of SAS (2000) with the model accounting for the effects of weight group and sex with significance determined at the level of $P < 0.05$. Regression analysis was conducted with the REG procedure (SAS, 2000) utilizing star fat weight as the independent variable whereas cubic (C), quadratic (Q), and linear (L) models were compared with the F test for lack of fit (Neter et al., 1990).

Results and discussion

Selection based on HCW resulted in a wide range of fat and lean measurements. Mean ham weights ranged from 8.09 - 12.07 kg, and last rib fat ranged from 0.76 - 3.05 cm. Ham weights also varied for the left side of 11.26, 10.64, and 9.82 kg and for the right side of 11.19, 10.53, and 9.66 kg (H, M, and L, respectively). Also, last rib fat differed for B (2.49 cm) and G (2.16 cm; $P < 0.05$). Star fat weight increased with the weight groups (0.08, 0.10 and 0.11 kg, respectively for L, M and H; $P < 0.05$). Linear fat measurements did not consistently predict star fat weight. Star fat area measurements had a correlation to seam fat weight (0.29). The three subcutaneous fat depth measurements taken at the midpoint, ventral and dorsal sites had moderate correlations of (0.17, 0.19 and 0.19, respectively) to star fat weight. However, these midpoint, ventral and dorsal fat depth measurements had higher correlations to seam fat (0.35, 0.29 and 0.28, respectively) and subcutaneous fat (0.76, 0.72 and 0.71, respectively). Both, seam and subcutaneous fat can explain a portion of the variation in star fat weight using cubic ($R^2 = 0.27$) and linear regressions ($R^2 = 0.30$). In addition, HCW can explain a portion of the variation in star fat weight using cubic regression ($R^2 = 0.27$).

Conclusions

By utilizing a few key variables, like HCW or ham weight, star fat weight could be minimized in ham production. HCW was the single best predictor of star fat. Selecting lower weight carcasses having less backfat would decrease seam fat occurrence in hams, thus making them more suitable for bone-in products. Future research will focus on better understanding of all carcass variables impacting the development of inter-muscular fat in the fresh pork leg according to the key genetic background/commercial lines of the pigs.

References

Neter, J., W., Wasserman and M. Kutner. 1990. Applied linear statistical models. IRWIN, Homewood, IL.
SAS. 2000. Version 8.1. SAS Institute Inc., Cary, NC.

Figure 1. Location of "star fat" in the pork leg